

SOLID STATE MEMBRANE CHANNEL DEVICE FOR THE MEASUREMENT AND CHARACTERIZATION OF ATOMIC AND MOLECULAR SIZED SAMPLES

ABSTRACT

A solid state device is formed through thin film deposition techniques which results in a self-supporting thin film layer that can have a precisely defined channel bored therethrough. The device is useful in the characterization of polymer molecules by measuring changes in various electrical characteristics as molecules pass through the channel. To form the device, a thin film layer having various patterns of electrically conductive leads are formed on a silicon substrate. Using standard lithography techniques, a relatively large or micro-scale aperture is bored through the silicon substrate which in turn exposes a portion of the thin film layer. This process does not affect the thin film. Subsequently, a high precision material removal process is used (such as a focused ion beam) to bore a precise nano-scale aperture through the thin film layer that coincides with the removed section of the silicon substrate.